



Dynamic soil-structure interaction: where soil stiffness and strength come into play

Field observations during past earthquakes have shown that the seismic behaviour of structures is greatly affected by the interacting soil, whose effects can be either beneficial or detrimental depending on the particular problem at hand. Moreover, recent experimental, theoretical and numerical studies have pointed out that the dynamic soil-structure interaction (SSI) can be essentially reduced to a strength-driven or a stiffness-driven problem, depending on the possible onset of plastic mechanisms within the soil-structure system.

In this seminar two different topics are addressed, i.e. the behaviour of gravity retaining walls under seismic actions and the filtering effect induced by embedded foundations on the motion transferred to the above structure, highlighting the role of soil strength and stiffness, respectively, on the overall observed behaviour. In the first case, the physical mechanisms affecting the possible accumulation of permanent displacements of the wall during the earthquake are illustrated, while in the second case attention is paid to the dimensionless factors governing the scattering problem.

Based on both experimental and numerical results, it is shown that even very simple theoretical models can provide a good description of the actual phenomenon, both qualitatively and quantitatively, provided that all the key features are adequately taken into account.

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